

REMARKS

Applicants have considered the outstanding official action mailed May 2, 2003. This amendment is submitted together with a request for continued examination under 37 CFR 1.114. Applicants submit that the claims are directed to patentable subject matter as set forth below. Full and favorable consideration of the present response is requested.

Claims 4-5 and 7-14 are rejected under 35 U.S.C. §112, second paragraph, for being indefinite based on the use of the word "obtainable" in claims 4, 8, and 12; and that the compounds which diffuse from a substrate in claim 12 require clarification.

Applicants advise that claims 4, 8 and 12 have been amended so that "obtainable" reads "obtained" in accordance with the Examiner's suggestion. Further in accordance with the Examiner's suggestion, claim 12 has been amended to incorporate the materials of claim 13 into claim 12 to clarify the compounds which diffuse from the substrate. Thus, applicants submit that the rejection under §112 has been overcome. Withdrawal of the §112 rejection is respectfully requested.

The outstanding rejections based on art are as follows:

- (1) Claims 4-5, 7-10 and 14 under 35 U.S.C. §103(a) over U.S. Patent No. 5,118,538 (Escher) in view of U.S. Patent No. 5,286,414 (Kämpf); and
- (2) Claims 11-13 under 35 U.S.C. §103(a) over Escher in view of Kämpf as applied above and further in view of U.S. Patent No. 5,465,169 (Eguchi).

Claims 4, 8 and 12 are the pending independent claims.

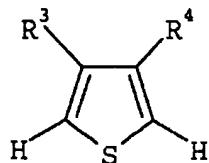
Claims 5, 7, 9-11 and 13-14 are dependent claims.

As acknowledged by the Examiner, the primary reference Escher does not disclose polythiophenes according to applicants' claimed formula (I) in which R¹ and R² together form an O-[C₁-C₄ alkylene]-O group or a O-[cycloalkylene]-O group. Escher discloses at column 4, lines 47-61, that owing to its good orienting properties (good planar orientation) and its high electrical conductivity, the use of a polymer of the formula (III) [poly(3-methoxythiophene) with a degree of polymerization of 5 or 6 and BF₄⁻ counterions] has proved particularly advantageous for orienting layers in displays. Escher claims liquid crystal orienting properties for poly(3,4-dialkoxythiopene)'s, but provides no enabling experimental support for the possibility that poly(3,4-dialkoxythiophene)'s exhibit liquid crystal orienting properties. One skilled in the art would be aware of the fact that

chemical species exhibit properties which are extremely dependent upon their chemical structure. Applicants thus submit that Escher does not teach that poly(3,4-dialkoxy-thiophene)'s exhibit liquid crystal orienting properties, much less teach that poly(3,4-dioxyalkylenethiophene)'s exhibit liquid crystal orienting properties.

Kämpf is relied on by the Examiner on the basis of its having been cited in Escher at column 2, lines 34-52 as follows:

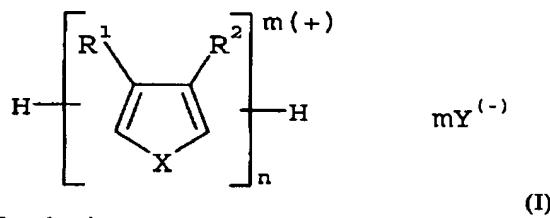
"Electrically conductive polymers, which are soluble in oxidized form in dipolar aprotic solvents at room temperature and which are derived from a monomer of the formula (II)



where at least one of the two radicals R³ and R⁴ is an alkoxy group and the other is optionally (C₁-C₆) alkyl or hydrogen, have already been described in DE-A 3,717,668, DE-A 3,628,895 and DE-A 3,736,114. The preparation, the stability and electrical conductivity of the various, positively doped polymers were also investigated therein."

This passage refers to polymers derived from monomers of formula (II). One skilled in the art would regard such polymers as a preferred embodiment of the polymers of formula (I). In this case R³ and R⁴ in formula (II) therefore must correspond to R¹ and R² in formula (I), i.e. the disclosure of formula (II) is dependent upon the disclosure of formula (I), i.e. -

"... an electrically conductive polymer which is composed of repetitive units of the formula (I):

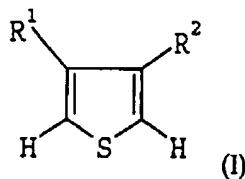


where R¹, R² are independently of each other, H, or straight-chain or branched alkyl or alkoxy containing 1-16 carbon atoms, or halogen, X is sulfur or NH, Y is BF₄⁻, PF₅⁻, PO₄³⁻, AsF₆⁻, SbCl₆⁻, SO₄²⁻, HSO₄⁻, alkyl-SO₃⁻, perfluoroalkyl-SO₃⁻, aryl-SO₃⁻, F⁻ or Cl⁻, and n is an integer from 4 to 100 and m is an integer from 1 to 30."

Since no reference is made to DE-A 3,717,668, DE-A 3,628,895, DE-A 3,736,114 or to any corresponding applications thereof in the disclosure of formula (I), the options for R¹ and R² in formula (II) cannot have a greater

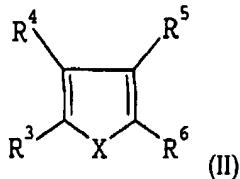
scope than those for formula (I) and hence any implied allusion to a previous description of R¹ and R² in DE-A 3,717,668, DE-A 3,628,895 and DE-A 3,736,114 must be limited to the options for R¹ and R² in formula (I). These options do not include the possibility of poly(3,4-dioxyalkylene-thiophene)s. Applicants therefore respectfully traverse the assertion of the Examiner that the full disclosure of DE-A 3,717,668, DE-A 3,628,895 and DE-A 3,736,114 as regards the definition of R¹ and R² in formula (I) can be incorporated into Escher as applied by the Examiner.

Kämpf discloses an electroconductive coating composition comprising 10 to 100% by weight of an oligomer having three to ten structural units which are connected to one another by a linkage in the two-position and/or five-position, on statistical average comprising 60 to 100% by weight of structural units derived from at least one monomer of the formula (1)

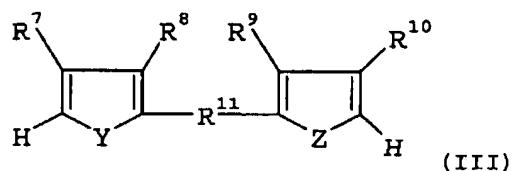


in which R¹ denotes a C₁-C₁₂ alkoxy group or -O(CH₂CH₂O)_nCH₃ where n=1 to 4 and R² denotes a hydrogen atom, a C₁-C₁₂ alkyl group, a C₁-C₁₂ -alkoxy group, or -O(CH₂CH₂O)_nCH₃ where n=1

to 4, or R¹ together with R² represents -O(CH₂)_m-CH₂- or -O(CH₂)_m-O-, in which m is 1 to 12, 0 to 40% by weight of structural units derived from at least one monomer of the formula (II)

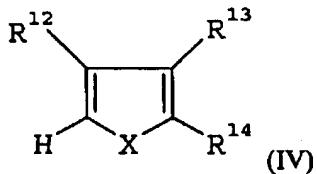


in which R⁴ and R⁵, independently of one another, denote a hydrogen atom, a halogen atom, a C₁-C₁₂-alkyl group or aryl or, together with the carbon atoms linking them, form an aromatic ring, R³ and R⁶, independently of one another, denote a hydrogen atom, or R³ together with R⁴ and the carbon atoms linking them, or R⁵ together with R⁶ together with the carbon atoms linking them, in each case form an aromatic ring, X denotes an oxygen atom, a sulfur atom, an =NH group, an =N-alkyl group or an =N-aryl group, 0 to 40% by weight of structural units derived from at least one monomer of formula (III)



in which R⁷, R⁸, R⁹ and R¹⁰ independently of one another denote a hydrogen atom, a C₁-C₁₂ alkyl group, a C₁-C₁₂-alkoxy

group or an aryl group, Y and Z, independently of one another, denote an oxygen atom, a sulfur atom, an =NH group, an =N-alkyl group or an =N-aryl group, R¹¹ denotes an arylene group, a heteroarylene group or a conjugated system of the formula -(CH=CH)₀, in which 0 is zero, 1, 2 or 3, 0 to 40% by weight of structural units derived from at least one monomer of the formula (IV)



in which R¹² and R¹³, independently of one another, denote a hydrogen atom, a halogen atom, a C₁-C₁₂-alkyl group, a C₁-C₁₂-alkoxy group, a C₁-C₄-alkylamino group or a C₁-C₄-acylamino group, R¹⁴ denotes a halogen atom, a C₁-C₁₂-alkyl group, a C₁-C₁₂-alkoxy group, a C₁-C₄-alkylamino group or a C₁-C₄-acylamino group and X has the above-mentioned meaning, where the oligomer, in the oxidized form, is completely soluble in dipolar aprotic solvents at 25°C, and solutions having a content of at least 0.5 g of the oligomer in 100 ml of solvent are obtained at 25°C, and 0 to 90% by weight of a polymer which is dissolved or swollen in solvents or solvent mixtures having a δ_p value greater than 3.5 (cal/ccm)^½ and δ_H value less than 6.5

(cal/ccm)[%]. Kämpf does not disclose preparation of poly(3,4-dioxyalkylenethiophene)s. The first disclosure of such polymers was in EP-A 339 340 which corresponds to U.S. Patent Nos. 4,959,430, 4,987,042 and 5,035,926. Further, while Kämpf purports to disclose solvent-soluble oligomers of poly(3,4-dioxyalkylenethiophene)s, later research has shown such to be insoluble and not swellable in solvent and solvent mixtures. Thus, even if these polymers were to be regarded as enabled by Kämpf, Kämpf was not in possession of the invention. Applicants therefore submit that Kämpf does not disclose poly(3,4-dioxyalkylenethiophene)s to one skilled in the art.

Accordingly, it is respectfully submitted that claims 4-5, 7-10 and 14 are not rendered obvious under 35 U.S.C. §103(a) over Escher in view of Kämpf. Withdrawal of the §103 rejection is requested.

As to the rejection of claims 11-13 under 35 U.S.C. §103(a) as being unpatentable over Escher in view of Kämpf as applied above and further in view of Eguchi, it is noted that Eguchi is relied on for teaching the additional features of an adhesion-improving anchor layer which has barrier properties to compounds which may diffuse from the substrate, and an electroconductive layer (electrode) made out of indium tin oxide. The primary reference to Escher is

acknowledged by the Examiner to not teach these elements. Eguchi distinguishes between the presence of an alignment material and of a polymeric electroconductive compound in the alignment film. Further, Eguchi exemplifies polyimide liquid crystal alignment materials and polyaniline, polypyrrole and poly-2,5-thienylene vinylene polymeric electroconductive compounds.

It is submitted that Escher and Kämpf do not teach as suggested the claimed invention as set forth above. Further, since Eguchi is only relied on for teaching additional isolated limitations with respect to claims 11-13, applicants submit that Eguchi does not make up for the shortcomings of the primary combination of Escher and Kämpf.

Accordingly, it is submitted that the combination of Escher, Kämpf and Eguchi also does not render the claimed invention obvious within the meaning of §103. No teaching or suggestion is provided to modify the disclosures as asserted by the Examiner to provide the claimed invention. Withdrawal therefore of the §103 rejection is respectfully requested.

Reconsideration and allowance of the application is respectfully requested.

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Group Art Unit 1772

Respectfully submitted

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